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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/066,618	02/06/2002	Satoshi Okada	03500.016166	4453

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EXAMINER	
SUNG, CHRISTINE	
ART UNIT	**PAPER NUMBER**
2878	

DATE MAILED: 06/08/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/066,618	OKADA ET AL.	
	Examiner	Art Unit	
	Christine Sung	2878	

-- The MAILING DATE of this communication appears on th cover she t with the correspondence address --

Period f r Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 March 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-21,23-30,32 and 42-54* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *13-20 and 45-54* is/are allowed.

6)☒ Claim(s) *1,2,4-6,8-12,21,23-30,32,42 and 44* is/are rejected.

7)☒ Claim(s) *3,7 and 43* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *06 February 2002* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Response to Amendment

1. The amendment filed on March 8, 2004 has been entered.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1, 4-6, 30 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takabayashi (US Patent 6,469,307) in view of Oi (US Patent 6,469,307) further in view of Kingsley (US Patent 5,153,438).

Regarding claims 1, 6 and 30, Takabayashi discloses a radiation detector or scintillator panel (Figure 1, element 2) having a wavelength conversion member or scintillator (element 16) and a sensor panel (See figures 5 a, element 32 and figure 5b, element 34, and column 4, lines 40-67) wherein the scintillator panel and sensor panels are bonded together. Takabayashi does not specify the smoothing of the bumps or protrusions formed on the surface of the scintillator panel to make flat or parallel. However, Oi discloses that during scintillator manufacture it is well known in the art to smooth surfaces to make flat or parallel using mechanical means such as polishing to increase scintillator accuracy (Column 2, lines 39-53). Further, Oi discloses that the facing surfaces of the scintillator, where the radiation impinges are usually made parallel to the (0,1,0) plane, meaning that if the scintillator crystal was described as a box, the surface would be polished as closely parallel to the top of the box as possible (column 2, lines 17-25). Therefore, it

is inherent that it is important to remove any protrusions or bumps along the surface of a scintillator to insure greater scintillator accuracy. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have used the invention as disclosed by Takabayashi with the smooth scintillator as disclosed by Oi to increase the accuracy of the detection of scintillation events during imaging. Further, Takabayashi in view of Oi does not disclose that the scintillator is a columnar shaped scintillator, however such shaped scintillators are well known in the art as disclosed by Kingsley (Figure 2, element 30). One of ordinary skill in the art would be motivated to take the wavelength conversion member or scintillator of Takabayshi in view of Oi and make it into the columnar scintillator disclosed by Kingsley in order to decrease cross talk within the scintillator, and increase the accuracy of the detected radiation. Further, Kingsley discloses that such scintillators are manufactured by methods including laser ablation of whole scintillation panels (column 6, lines 29-31), which teaches that whole sheet scintillators can be made into columnar scintillators.

Regarding claims and 4 and 8, Takabayashi discloses that the scintillator or wavelength conversion layer is covered with a protective layer (Figure 4 B, element 18).

Regarding claims and 5 and 9, Takabayashi discloses that the preferred scintillator is made of Cesium Iodide (Column 4, lines 9-10).

Regarding claim 32, Takabayashi discloses that the scintillator panel and sensor panel are bonded together, (see abovementioned paragraphs), but does not specify the thickness of the adhesion layer. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have determined the thickness of the adhesion layer to be less than 50 micrometers or to a desired thickness, since it has been held that where the general conditions of

a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller,* 220 F 2d 454. 105 USPQ 233, 235 (CCPA 1955).

4. Claims 10-12, 21 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takabayashi (US Patent 6,469,307) in view of Okamura et al (US Patent 6,384,417) further in view of Kingsley (US Patent 5,153,438).

Regarding claims 10-12, 21 and 23 Takabayashi discloses a scintillator panel (Figure 4B), having a wavelength conversion member or scintillator (element 16) formed on a substrate (element 10), and a sensor panel for detecting light converted by the scintillator panel (See figures 5 a, element 32 and figure 5b, element 34, and column 4, lines 40-67) but does not specify that the bumps or projections on surface of the scintillator be made smaller than a threshold value of 50 micrometers. However, Okamura discloses that the surfaces of scintillators are preferably smooth, specifically with a mean roughness of 0.01-0.80 micrometers. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have used the roughness requirements of the scintillator as disclosed by Okamura with the invention as disclosed by Takabayashi, to reduce scattering of light, as Okamura discloses that roughness exceeding 0.80 micrometers increases the scattering of light decreasing luminous efficiency. Further, Takabayashi in view of Okamura does not disclose that the scintillator is a columnar shaped scintillator, however such shaped scintillators are well known in the art as disclosed by Kingsley (Figure 2, element 30). One of ordinary skill in the art would be motivated to take the wavelength conversion member or scintillator of Takabayshi in view of Okamura into the columnar scintillator disclosed by Kingsley in order to decrease cross talk within the scintillator, and increase the accuracy of the detected radiation. Further, Kingsley discloses that

such scintillators are manufactured by methods including laser ablation of whole scintillation panels (column 6, lines 29-31), which teaches whole sheet scintillators can be made into columnar scintillators.

5. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takabayashi (US Patent 6,469,307) in view of Oi (US Patent 6,469,307) in view of Kingsley (US Patent 5,153,438) further in view of Okamura et al (US Patent 6,384,417).

Regarding claim 2, the limitations set forth in claims 1 have been disclosed in the abovementioned paragraphs. Takabayashi in view of Oi further in view of Kingsley does not specifically disclose that the height of each projection before bonding is 50 micrometers or lower. However, Okamura discloses that the surfaces of scintillators are preferably smooth, specifically with a mean roughness of 0.01-0.80 micrometers. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have used the roughness requirements of the scintillator as disclosed by Okamura with the invention as disclosed by Takabayashi in view of Oi, to reduce scattering of light, as Okamura discloses that roughness exceeding 0.80 micrometers increases the scattering of light decreasing luminous efficiency.

6. Claims 24-29 and 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takabayashi (US Patent 6,469,307) in view of Okamura et al (US Patent 6,384,417) in view of Kingsley (US Patent 5,153,438) further in view of Oi (US Patent 6,469,307).

Regarding claims 24-27, the limitations of claim 21 have been disclosed in the abovementioned paragraphs by Takabayashi in view of Okamura further in view of King, but does not disclose scraping, crushing, cutting or lasting to smooth out the projections. Oi discloses a mechanical buffing of the surface as a means to reducing the roughness or projections of the

surface. It is well known in the art that scraping, crushing, cutting, and lasing are common mechanical techniques used in surface smoothing. Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to have used any of the claimed techniques since it would only involve a matter of design choice.

Regarding claims 28-29 and 42 Takabayashi discloses an apparatus for manufacturing a scintillator panel (Takabayashi, Figure 4B), having a wavelength conversion member or scintillator (element 16) but does not disclose the specifics of determining the threshold or detection of projections. Okamura discloses a specific roughness range of the surface of the scintillator, and further it is inherent that in order to determine the roughness characteristic of the surface of a scintillator, a means for detecting the projections and recesses of the surface must be present, a means for measuring the height difference and a means for comparing the height difference to the predetermined roughness range or threshold. All of these characteristics are inherent to Okamura's invention because the roughness characteristics cannot be determined without these necessary elements. It is well known in the art to measure height differences to calculate roughness, and it is well known in the art to set a desired threshold height. In order to determine the roughness of a given surface, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have used the invention disclosed by Takabayashi with the necessary requirements as disclosed by Okamura to have increased the accuracy of the surface smoothing process of the scintillator. Further Takabayashi in view of Okamura does not disclose that the that the scintillator is a columnar shaped scintillator, however such shaped scintillators are well known in the art as disclosed by Kingsley (Figure 2, element 30). One of ordinary skill in the art would be motivated to take the wavelength conversion

member or scintillator of Takabayshi in view of Okamura into the columnar scintillator disclosed by Kingsley in order to decrease cross talk within the scintillator, and increase the accuracy of the detected radiation. Further, Kingsley discloses that such scintillators are manufactured by methods including laser ablation of whole scintillation panels (column 6, lines 29-31), which teaches whole sheet scintillators can be made into columnar scintillators. Further Takabayashi in view of Okamura further in view of Kingsley does not disclose the specifics of the apparatus. However, Oi discloses that during scintillator manufacture it is well known in the art to smooth surfaces using mechanical means such as polishing to increase scintillator accuracy (Column 2, lines 39-53). Further, Oi discloses that the facing surfaces of the scintillator, where the radiation impinges are usually made parallel to the (0,1,0) plane, meaning that the if the scintillator crystal was described as a box, the surface would be polished as closely parallel to the top of the box as possible (column 2, lines 17-25). Therefore, it is inherent that it is important to remove any protrusions or bumps along the surface of a scintillator to insure greater scintillator accuracy. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have used the invention as disclosed by Takabayashi in view of Okamura further in view of Kingsley with the smooth scintillator as disclosed by Oi to increase the accuracy of the detection of scintillation events during imaging.

7. Claim 44 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takabayashi (US Patent 6,469,307) in view of Oi (US Patent 6,469,307) further in view of Kingsley (US Patent 5,153,438) further in view of Petrillo (US Patent 6,160,259).

The elements listed in claim 44 are well known elements that are frequently used in radiation detection systems. Petrillo et al. discloses the elements as disclosed in the claims (see

column 1, line 1-column 14, line 57). It would have been obvious to one having ordinary skill in the art at the time the invention was made to have used the elements claimed with the radiation detector panel as disclosed by Takabayashi in view of Oi further in view of Kingsley, as these devices are specifically made for radiation detection devices as disclosed by Petrillo.

Response to Arguments

8. Applicant's arguments filed March 8, 2004 have been fully considered but they are not persuasive.

Applicant's argument regarding claim 1 is not persuasive because, having a sensor panel (figure 5A, element 32) opposite a scintillator (element 2) is well known in the art, as demonstrated by Takabayashi. Further, regarding claim 1, applicant's invention includes reducing the projections upon a surface of a scintillator, but the claim does not include removing said projections, it merely states that there is a projection present in the detector. Therefore the presently amended claim does not alleviate or address the instant invention. It is also inherent because the invention is drawn to alleviating this problem that the problem already exists, meaning that projections are formed upon scintillation materials upon fabrication.

Applicant's argument regarding claim 6 is not persuasive because although Takabayashi in view of Oi does not specifically state that the projections are smoothed in parallel, it is inherent that the scintillator be substantially flat or parallel. Conventional scintillators are made with substantially parallel or flat surfaces in order to insure an even distribution in radiation detection and to decrease the complexity of the fabrication of the detector. Further during scintillator growth, because it is often vapor deposited or other conventional methods, there are always imperfections or projections that form due to dust or other growth errors. Oi discloses a

method of removing most of such projections and Takabayashi discloses placing a scintillator parallel to the sensor panel. Again, columnar shaped scintillators are well known in the art, as disclosed by Kingsley in the abovementioned paragraphs.

Applicant's argument regarding claim 10 is not persuasive because scintillators are typically grown on a substrate, and Oi discloses polishing the side of the scintillator opposite the substrate. Again, applicant's invention includes reducing the projections upon a surface of a scintillator, but the claim does not include removing said projections, it merely states that there is a projection present in the detector. Therefore the presently amended claim does not alleviate or address the instant invention. It is also inherent, because the invention is drawn to alleviating this problem that the problem already exists, meaning that projections are formed upon scintillation materials upon fabrication. Again having a sensor panel (figure 5A, element 32) opposite a scintillator (element 2) is well known in the art, as demonstrated by Takabayashi. Further Okamura does not describe that the scintillator or wavelength conversion member is positioned opposite to the substrate, but rather Takabayashi discloses this limitation as described in the abovementioned paragraphs.

Regarding claims 21, 30 and 42, Oi discloses smoothing out the projections, which inherently means the projections are being made smaller.

Allowable Subject Matter

9. Claims 13-20 and 45-54 are allowed.

10. Claims 3, 7 and 43 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Regarding claims 3, 7, 13-20 and 43, the allowable subject matter was disclosed in the prior office action.

Regarding claims 45-54, none of the prior art of record discloses the specific step of depositing a protective layer and then proceeding to remove the projections or bumps. Although many references such as Oi, disclose mechanical buffing of the surface to attain a uniformly smooth surface, Oi does not specify the deposition of a protective layer before smoothing the surface. Further, protective layers are well known in the art, as demonstrated by Takabayashi, but the addition of these protective layers is after the step of smoothing the surface.

Conclusion

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christine Sung whose telephone number is 571-272-2448. The examiner can normally be reached on Monday- Thursday 7-5 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Porta can be reached on 571-272-2444. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Christine Sung
Examiner
Art Unit 2878

CS

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